American Academy of Neurology/American College of Radiology/
Physician Consortium for Performance Improvement®/National Committee for Quality
Assurance

Stroke and Stroke Rehabilitation
Physician Performance Measurement Set

September 2006

Stroke and Stroke Rehabilitation
Work Group
Joseph Drozda, Jr., MD (Co-Chair)
Robert Holloway, MD, MPH (Co-Chair)
David Seidenwurm, MD (Co-Chair)

Chris Alexander, III, MD, FACP
John Barr, MD
Oscar Benavente, MD, FRCPC
Christopher Bever, Jr., MD, MBA
Thomas Bleck, MD FCCM
Ronald Gabel, MD
Judith Hinchey, MD
Irene Katzan, MD
Rahul K. Khare, MD
Michael Lev, MD
John McMahon, MD
Mark Morasch, MD, FACS
Suresh Mukherji, MD

Konrad C. Nau, MD
Sam J. W. Romeo, MD, MBA
Eric Russell, MD FACR
Marilyn Rymer, MD
Ajay Sharma, MD
John Schneider, MD PhD
Timothy Shephard, PhD
Michael A. Sloan, MD, MS
William D. Smucker, MD, CMD
Patrick Turski, MD FACR
Linda Williams, MD
Richard Zorowitz, MD

American Academy of Neurology Staff
Sarah Tonn, MPH

American College of Radiology Staff
Sandra H. Bjork, RN, JD

American Heart Association/American Stroke Association Staff
Penelope Solis, JD

Health Plan Representative
Andrea Gelzer, MD, MS FACP

American Medical Association
Karen S. Kmetik, PhD
Mark Antman, DDS, MBA
Beth Tapper, MA
Samantha Tierney, MPH

Facilitators
Timothy F. Kresowik, MD
Rebecca A. Kresowik

National Committee for Quality Assurance
Donna Pillittere, MS

Mathematica Policy Research
Tom Croghan, MD

Centers for Medicare & Medicaid Services
Latousha Leslie, RN, MS
Susan Nedza, MD, MBA, FACEP
Sylvia Publ, MBA, RHIA

Joint Commission on Accreditation of Healthcare Organizations
Elvira Ryan, RN

Intended Audience and Patient Population:

Measures #1-6 and #9 are designed for any physician caring for patients with a diagnosis of stroke or transient ischemic attack (TIA) in the hospital setting

Measures #7-8 are designed for radiologists and other physicians reading the imaging studies of patients with a diagnosis of stroke or TIA in the hospital setting

Patients aged 18 years and older

These clinical performance measures are designed for individual quality improvement. Some of the measures may also be appropriate for accountability if appropriate sample sizes and implementation rules are achieved.

Accountability Measures:
Measure #1:   Deep Vein Thrombosis (DVT) Prophylaxis for Ischemic Stroke or Intracranial Hemorrhage
Measure #2:   Discharged on Antiplatelet Therapy
Measure #3:   Anticoagulant Therapy Prescribed for Atrial Fibrillation
Measure #4:   Tissue Plasminogen Activator (t-PA) Considered
Measure #5:   Screening for Dysphagia
Measure #6:   Consideration of Rehabilitation Services
Measure #7:   Carotid Imaging Reports
Measure #8:   CT or MRI Reports

Quality Improvement Only:
Measure #9: Overuse Measure - Avoidance of Intravenous Heparin

Stroke and Stroke Rehabilitation
Measure #1: Deep Vein Thrombosis Prophylaxis (DVT) for
Ischemic Stroke or Intracranial Hemorrhage
This measure may be used as an Accountability measure.

Data Elements	Clinical Performance Measure	Feedback
Per Patient, Per Hospitalization Yes/No – Patient received DVT prophylaxis (LMWH, OR LDUH, OR intravenous heparin, OR low-dose subcutaneous heparin, OR intermittent pneumatic compression devices) by end of hospital day 2 Yes/No – Documentation of medical reason(s) (including physician documentation that patient is ambulatory) for not receiving DVT prophylaxis by end of hospital day 2 Yes/No – Documentation of patient reason(s) for not receiving DVT prophylaxis by end of hospital day 2 **Sources** Electronic medical record Paper medical record Flowsheet Administrative claims data* * adequate data source only if new codes are developed specific to the intent of this measure	**Numerator:** Patients who received DVT prophylaxis by end of hospital day 2 **Denominator:** All patients aged 18 years and older with the diagnosis of *ischemic stroke* OR *intracranial hemorrhage* **Denominator Exclusions:** Documentation of medical reason(s) (including physician documentation that patient is ambulatory) for not receiving DVT prophylaxis by end of hospital day 2 Documentation of patient reason(s) for not receiving DVT prophylaxis by end of hospital day 2 **Measure:** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* OR *intracranial hemorrhage* who received DVT prophylaxis by end of hospital day 2	**Per Patient** Whether or not the patient aged 18 years and older with the diagnosis of *ischemic* stroke OR *intracranial hemorrhage* received DVT prophylaxis by end of hospital day 2 **Per Patient Population** Percentage of patients aged 18 years and older with the diagnosis of *ischemic* stroke OR *intracranial hemorrhage* who received DVT prophylaxis by end of hospital day 2

The following clinical recommendation statements are quoted <u>verbatim</u> from the referenced clinical guidelines and represent the evidence base for the measure:
Subcutaneous unfractionated heparin, LMW heparins, and heparinoids may be considered for DVT prophylaxis in at-risk patients with acute ischemic stroke, recognizing that nonpharmacologic treatments for DVT prevention also exist. (AAN/ASA[1]) (Grade A)

The use of intermittent external compression stockings or aspirin for patients who cannot receive anticoagulants is strongly recommended to prevent deep vein thrombosis among immobilized patients. (ASA[3]) (Grades A and B)

For acute stroke patients with restricted mobility, we recommend prophylactic low-dose subcutaneous heparin or low-molecular-weight heparins or heparinoids. (Grade 1A) In patients with an acute ICH, we recommend the initial use of intermittent pneumatic compression for the prevention of DVT and PE. (Grade 1C+) In stable patients, we suggest low-dose subcutaneous heparin may be initiated as soon as the second day after the onset of the hemorrhage. (Grade 2C) (ACCP[8])

Rationale for the measure:
Patients on bed rest are at high risk for deep vein thrombosis. DVT prevention is important for all patients who have suffered a stroke or an intracranial hemorrhage and may have decreased mobility. The intent of this measure is to assure that adequate DVT prophylaxis is received for either diagnosis. As noted in the clinical recommendation statements, the appropriate *type* of prophylaxis differs by diagnosis. Anticoagulants are generally contraindicated in patients with intracranial hemorrhage. These patients are still at risk for DVT so they should receive prophylaxis with mechanical devices. Low-dose subcutaneous heparin may be initiated on the second day after onset of the hemorrhage. Data elements required for the measure can be captured and the measure is actionable by the physician.

Stroke and Stroke Rehabilitation
Measure #2: Discharged on Antiplatelet Therapy
This measure may be used as an Accountability measure.

Data Elements	Clinical Performance Measure	Feedback
Per Patient, Per Hospitalization Yes/No – Patient was prescribed antiplatelet therapy at discharge Yes/No – Documentation of medical reason(s) for not prescribing antiplatelet therapy at discharge (including identification from medical record that patient on anticoagulation therapy) Yes/No – Documentation of patient reason(s) for not prescribing antiplatelet therapy at discharge **Sources** Electronic medical record Paper medical record Flowsheet Administrative claims data* * adequate data source only if new codes are developed specific to the intent of this measure	**Numerator:** Patients who were prescribed antiplatelet therapy at discharge **Denominator:** All patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* **Denominator Exclusions:** Documentation of medical reason(s) for not prescribing antiplatelet therapy at discharge (including identification from medical record that patient is on anticoagulation therapy) Documentation of patient reason(s) for not prescribing antiplatelet therapy at discharge **Measure:** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* who were prescribed antiplatelet therapy at discharge	**Per Patient** Whether or not the patient aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* was prescribed antiplatelet therapy at discharge **Per Patient Population** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* who were prescribed antiplatelet therapy at discharge

The following clinical recommendation statements are quoted <u>verbatim</u> from the referenced clinical guidelines and represent the evidence base for the measure:
We recommend that every patient who has experienced a noncardioembolic (atherothrombotic, lacunar, or cryptogenic) stroke or TIA and has no contraindication receives an antiplatelet agent regularly to reduce the risk of recurrent stroke and other vascular events. Aspirin, 50 to 325 mg qd; the combination of aspirin, 25 mg, and extended-release dipyridamole, 200 mg bid; or clopidogrel, 75 mg qd, are all acceptable options for initial therapy. (ACCP[2]) (Grade 1A)

For patients with noncardioembolic ischemic stroke or TIA, antiplatelet agents rather than oral anticoagulation are recommended to reduce the risk of recurrent stroke and other cardiovascular events. (ASA[6]) (Class I, Level of Evidence: A)

Aspirin (50 to 325 mg/d), the combination of aspirin and extended-release dipyridamole, and clopidogrel are all acceptable options for initial therapy (ASA[6]) (Class IIa, Level of Evidence: A)

Rationale for the measure:
Following a stroke, patients should be on antiplatelet therapy to decrease the risk of additional strokes. Data elements required for the measure can be captured and the measure is actionable by the physician.

Stroke and Stroke Rehabilitation
Measure #3: Anticoagulant Therapy Prescribed for Atrial Fibrillation at Discharge
This measure may be used as an Accountability measure.

Data Elements	Clinical Performance Measure	Feedback
Per Patient, Per Hospitalization Yes/No – Patient was prescribed an anticoagulant at discharge Yes/No – Patient has documented permanent, persistent, or paroxysmalatrial fibrillation Yes/No – Documentation of medical reason(s) for not prescribing an anticoagulant at discharge Yes/No – Documentation of patient reason(s) for not prescribing an anticoagulant at discharge **Sources** Electronic medical record Paper medical record Flowsheet Administrative claims data* * adequate data source only if new codes are developed specific to the intent of this measure	**Numerator:** Patients who were prescribed an anticoagulant at discharge **Denominator:** All patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* with documented permanent, persistent, or paroxysmal atrial fibrillation **Denominator Exclusions:** Documentation of medical reason(s) for not prescribing an anticoagulant at discharge Documentation of patient reason(s) for not prescribing an anticoagulant at discharge **Measure:** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* with documented permanent, persistent, or paroxysmal atrial fibrillation who were prescribed an anticoagulant at discharge	**Per Patient** Whether or not the patient aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* with documented permanent, persistent, or paroxysmal atrial fibrillation was prescribed an anticoagulant at discharge **Per Patient Population** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* with documented permanent, persistent, or paroxysmal atrial fibrillation who were prescribed an anticoagulant at discharge

The following clinical recommendation statements are quoted <u>verbatim</u> from the referenced clinical guidelines and represent the evidence base for the measure:
Administer antithrombotic therapy (oral anticoagulation or aspirin) to all patients with AF, except those with lone AF, to prevent thromboembolism. (ACC/AHA/ESC[4])(Class I, Level of Evidence: A)

We recommend that clinicians use long-term oral anticoagulation (target INR of 2.5; range, 2.0 to 3.0) for prevention of stroke in atrial fibrillation patients who have suffered a recent stroke or TIA. Oral anticoagulation is also beneficial for prevention of recurrent stroke in patients with several other high-risk cardiac sources. (ACCP[2]) (Grade 1A)

For patients with ischemic stroke or TIA with persistent or paroxysmal AF, anticoagulation with adjusted-dose warfarin (target INR, 2.5; range2.0 to 3.0) is recommended. (ASA[6]) (Class I, Level of Evidence: A)

Rationale for the measure:
Patients with atrial fibrillation (either permanent, persistent, or paroxysmal) and stroke should be prescribed an anticoagulant to prevent recurrent strokes. Data elements required for the measure can be captured and the measure is actionable by the physician.

Stroke and Stroke Rehabilitation
Measure #4: Tissue Plasminogen Activator (t-PA) Considered
This measure may be used as an Accountability measure.

Data Elements	Clinical Performance Measure	Feedback
Per Patient, Per Hospitalization Yes/No – Patient was considered for t-PA administration (given t-PA or documented reasons for patient not being a candidate for therapy) Yes/No – Symptom onset is less than 3 hours **Sources** Electronic medical record Paper medical record Flowsheet Administrative claims data* * adequate data source only if new codes are developed specific to the intent of this measure	**Numerator:** Patients who were considered for t-PA administration (given t-PA or documented reasons for patient not being a candidate for therapy) **Denominator:** All patients aged 18 years and older with the diagnosis of *ischemic* stroke whose time from symptom onset to arrival is less than 3 hours **Measure:** Percentage of patients aged 18 years and older with the diagnosis of *ischemic* stroke whose time from symptom onset to arrival is less than 3 hours who were considered for t-PA administration	**Per Patient** Whether or not the patient aged 18 years and older with the diagnosis of *ischemic* stroke whose time from symptom onset to arrival is less than 3 hours was considered for t-PA administration **Per Patient Population** Percentage of patients aged 18 years and older with the diagnosis of *ischemic* stroke whose time from symptom onset to arrival is less than 3 hours who were considered for t-PA administration

The following clinical recommendation statements are quoted <u>verbatim</u> from the referenced clinical guidelines and represent the evidence base for the measure:
We recommend administration of IV tPA in a dose of 0.9 mg/kg (maximum of 90 mg), with 10% of the total dose given as an initial bolus and the remainder infused over 60 min for eligible patients, provided that treatment is initiated within 3 h of clearly defined symptom onset. We recommend strict adherence to eligibility criteria for the use of IV tPA based on the NINDS trial protocol. (<u>Inclusion Criteria</u>: Age ≥ 18 years, clinical diagnosis of stroke with a clinically meaningful neurologic deficit, clearly defined time of onset of < 180 min before treatment, and a baseline CT showing no evidence of intracranial hemorrhage. (ACCP[2]) (Grade 1A)

Intravenous rtPA (0.9 mg/kg, maximum dose 90 mg) is strongly recommended for carefully selected patients who can be treated within 3 hours of onset of ischemic stroke. (ASA[3]) (Grade A)

Rationale for the measure:
Patients who arrive at the hospital within 3 hours of stroke symptom onset should be considered for t-PA therapy. Data elements required for the measure can be captured and the measure is actionable by the physician.

Stroke and Stroke Rehabilitation
Measure #5: Screening for Dysphagia
This measure may be used as an Accountability measure.

Data Elements	Clinical Performance Measure	Feedback
Per Patient, Per Hospitalization Yes/No – Patient underwent a dysphagia screening process before taking any foods, fluids or medication by mouth Yes/No – Documentation of medical reason(s) for not screening for dysphagia before taking any foods, fluids or medication by mouth Sources Electronic medical record Paper medical record Flowsheet Administrative claims data* * adequate data source only if new codes are developed specific to the intent of this measure	Numerator: Patients who underwent a dysphagia screening process before taking any foods, fluids or medication by mouth Denominator: All patients aged 18 years and older with the diagnosis of *ischemic stroke* or *intracranial hemorrhage* who receive any foods, fluids or medication by mouth Denominator Exclusion: Documentation of medical reason(s) for not screening for dysphagia before taking any foods, fluids or medication by mouth Measure: Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *intracranial hemorrhage* who underwent a dysphagia screening process before taking any foods, fluids or medication by mouth	Per Patient Whether or not the patient aged 18 years and older with the diagnosis of *ischemic stroke* or *intracranial hemorrhage* underwent a dysphagia screening process before taking any foods, fluids or medication by mouth Per Patient Population Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *intracranial hemorrhage* who underwent a dysphagia screening process before taking any foods, fluids or medication by mouth

The following clinical recommendation statements are quoted <u>verbatim</u> from the referenced clinical guidelines and represent the evidence base for the measure:
Recommend that all patients have their swallow screened before initiating oral intake of fluids or food, utilizing a simple valid bedside testing protocol. (VA/DoD[5]) (Evidence II-2, Grade B)

Rationale for the measure:
All patients should have their swallowing evaluated prior to receiving food, fluids or oral medications to help prevent aspiration. The evaluation should be performed with a validated or hospital-approved dysphagia screening tool; a routine cranial nerve examination is not sufficient. Data elements required for the measure can be captured and the measure is actionable by the physician.

Stroke and Stroke Rehabilitation
Measure #6: Consideration of Rehabilitation Services
This measure may be used as an Accountability measure.

Data Elements	Clinical Performance Measure	Feedback
Per Patient, Per Hospitalization Yes/No –Consideration of rehabilitation services (ordered rehabilitation or documented that rehabilitation was not indicated) is documented **Sources** Electronic medical record Paper medical record Flowsheet Administrative claims data* * adequate data source only if new codes are developed specific to the intent of this measure	**Numerator:** Patients for whom consideration of rehabilitation services (ordered rehabilitation or documented that rehabilitation was not indicated) is documented **Denominator:** All patients aged 18 years and older with the diagnosis of *ischemic stroke* or *intracranial hemorrhage* **Measure:** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *intracranial hemorrhage* for whom consideration of rehabilitation services is documented	**Per Patient** Whether or not consideration of rehabilitation services is documented for the patient aged 18 years and older with the diagnosis of *ischemic stroke* or *intracranial hemorrhage* **Per Patient Population** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *intracranial hemorrhage* for whom consideration of rehabilitation services is documented

The following clinical recommendation statements are quoted <u>verbatim</u> from the referenced clinical guidelines and represent the evidence base for the measure:
Strongly recommend that patients in need of rehabilitation services have access to a setting with a coordinated and organized rehabilitation care team that is experienced in providing stroke services. The coordination and organization of inpatient post–acute stroke care will improve patient outcome. (VA/DoD[5]) (Evidence I, Grade A)

Rationale for the measure:
All patients should be considered for rehabilitation services to meet the individual patient needs. Data elements required for the measure can be captured and the measure is actionable by the physician.

Stroke and Stroke Rehabilitation
Measure #7: Carotid Imaging Reports
This measure may be used as an Accountability measure.

Data Elements	Clinical Performance Measure	Feedback
Per Patient, Per Hospitalization Yes/No – Final reports of the carotid imaging studies performed (neck MR angiography [MRA], neck CT angiography [CTA], neck duplex ultrasound, carotid angiogram), with characterization of an internal carotid stenosis in the 30-99% range, include reference to measurements of distal internal carotid diameter as the denominator for stenosis measurement. Yes/No – Documentation of medical reason(s) for not including reference to measurements of distal internal carotid diameter. **Sources** Electronic medical record Paper medical record Flowsheet Administrative claims data* * adequate data source only if new codes are developed specific to the intent of this measure	**Numerator:** Patients whose final reports of the carotid imaging studies performed with characterization of an internal carotid stenosis in the 30-99% range, include reference to measurements of distal internal carotid diameter as the denominator for stenosis measurement. **Denominator:** All patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* undergoing carotid imaging **Denominator Exclusion:** Documentation of medical reason(s) for not including reference to measurements of distal internal carotid diameter **Measure:** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* whose final reports of the carotid imaging studies performed, with characterization of an internal carotid stenosis in the 30-99% range include reference to measurements of distal internal carotid diameter as the denominator for stenosis measurement	**Per Patient** Whether or not the final report of the carotid imaging studies with characterization of an internal carotid stenosis in the 30-99% range for the patient aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* includes reference to measurements of distal internal carotid diameter as the denominator for stenosis measurement. **Per Patient Population** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* whose final reports of the carotid imaging studies performed with characterization of an internal carotid stenosis in the 30-99% range includes reference to measurements of distal internal carotid diameter as the denominator for stenosis measurement.

The following clinical recommendation statements are quoted <u>verbatim</u> from the referenced clinical guidelines and represent the evidence base for the measure:

For patients with symptomatic atherosclerotic carotid stenosis >70%, as defined using the NASCET criteria, the value of carotid endarterectomy (CEA) has been clearly established from the results of 3 major prospective randomized trials: the NASCET, the European Carotid Surgery Trial (ECST), and the Veterans Affairs Cooperative Study Program. Among symptomatic patients with TIAs or minor strokes and high-grade carotid stenosis, each trial showed impressive relative and absolute risk reductions for those randomized to surgery. For patients with carotid stenosis <50%, these trials showed that there was no significant benefit of surgery. (ASA[6])

It is important to consider that the degree of carotid stenosis in ECST was measured differently than that in NASCET. The degree of carotid stenosis is significantly higher if calculated by the NASCET rather than the ECST method. In summary, it appears that patients with a recent TIA or nondisabling stroke with ipsilateral carotid stenosis benefit from surgery if the stenosis is >50% as measured by the NASCET method; however, this benefit appears to be less pronounced in women. Recently symptomatic patients with >70% stenosis as measured by the NASCET method can expect a far greater benefit from carotid endarterectomy. (AHA[7])

Rationale for the measure:
Since the clinical decision-making is based on randomized trial evidence and degree of stenosis is an important element of the decision for carotid intervention, characterization of the degree of stenosis needs to be standardized. Requiring that stenosis calculations be based on a denominator of distal internal carotid diameter or, in the case of duplex ultrasound, velocity measurements that have been correlated to angiographic stenosis calculations based on distal internal carotid diameter, makes the measure applicable to both imaging and duplex studies.

Data elements required for the measure can be captured and the measure is actionable by the physician.

Stroke and Stroke Rehabilitation
Measure #8: Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) Reports
This measure may be used as an Accountability measure.

Data Elements	Clinical Performance Measure	Feedback
Per Patient, Per Hospitalization Yes/No – Final report of the initial CT or MRI includes documentation of the presence or absence of each of the following: hemorrhage **and** mass lesion **and** acute infarction **Sources** Electronic medical record Paper medical record Flowsheet Administrative claims data* * adequate data source only if new codes are developed specific to the intent of this measure	**Numerator:** Patients whose final report of the initial CT or MRI includes documentation of the presence or absence of each of the following: hemorrhage **and** mass lesion **and** acute infarction **Denominator:** All patients aged 18 years and older with the admitting diagnosis of *ischemic stroke* or *TIA* or *intracranial hemorrhage* undergoing CT or MRI of the brain within 24 hours of arrival at the hospital **Measure:** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* or *intracranial hemorrhage* undergoing CT or MRI of the brain within 24 hours of arrival at the hospital whose final report of the CT or MRI includes documentation of the presence or absence of each of the following: hemorrhage **and** mass lesion **and** acute infarction	**Per Patient** Whether or not the patient aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* or *intracranial hemorrhage* undergoing CT or MRI of the brain within 24 hours of arrival at the hospital and the final report of the CT or MRI includes documentation of the presence or absence of each of the following: hemorrhage **and** mass lesion **and** acute infarction **Per Patient Population** Percentage of patients aged 18 years and older with the diagnosis of *ischemic stroke* or *TIA* or *intracranial hemorrhage* undergoing CT or MRI of the brain within 24 hours of arrival at the hospital whose final report of the CT or MRI includes documentation of the presence or absence of each of the following: hemorrhage **and** mass lesion **and** acute infarction

The following clinical recommendation statements are quoted <u>verbatim</u> from the referenced clinical guidelines and represent the evidence base for the measure:

Brain imaging is required to guide acute intervention. (Grade A) There is a uniform agreement that CT accurately identifies most cases of intracranial hemorrhage and helps discriminate nonvascular causes of neurological symptoms, eg, brain tumor. (Grade B) With the advent of rtPA treatment, interest has grown in using CT to identify subtle, early signs of ischemic brain injury (early infarct signs) or arterial occlusion that might affect decisions about treatment. The presence of these signs is associated with poor outcomes. (Class A) (ASA[3])

A technically adequate head CT scan is required prior to administration of thrombolytic therapy to exclude brain hemorrhage and nonischemic diagnoses. The baseline CT scan is also sensitive for detection of early signs of cerebral infarction. Subtle or limited signs of early infarction on the CT scan are common even within the first 3 h of stroke evolution.

Preliminary data suggest that specific MRI profiles may identify patients who are particularly likely to benefit from thrombolytic therapy. New MRI techniques including perfusion-weighted and diffusion-weighted may detect ischemic injury in the first hour and may reveal the extent of reversible and irreversible injury. In addition, MRI appears to be highly sensitive for identification of acute brain hemorrhage. (ACCP[8])

Rationale for the measure:

The CT and MRI findings are critical to initiating care for the patient with stroke. All CT and MRI reports should address the presence or absence of these three important findings. This documentation is particularly vital in the report of the first imaging study performed after arrival at the hospital, on which initial treatment decisions will be based. Data elements required for the measure can be captured and the measure is actionable by the physician.

Stroke and Stroke Rehabilitation
Measure #9: Overuse Measure – Avoidance of Intravenous Heparin
This measure may be used as a Quality Improvement measure only.

Data Elements	Clinical Performance Measure	Feedback
Per Patient, Per Hospitalization Yes/No – Patient did not receive intravenous unfractionated heparin Yes/No-Documentation that patient is undergoing carotid endarterectomy or carotid angioplasty-stenting Yes/No – Documentation of other medical reason(s) for patient receiving intravenous unfractionated heparin **Sources** Electronic medical record Paper medical record Flowsheet Administrative claims data* * adequate data source only if new codes are developed specific to the intent of this measure	Numerator: Patients who did not receive intravenous unfractionated heparin Denominator: All patients aged 18 years and older with the diagnosis of *ischemic* stroke Denominator Exclusion: Patients undergoing carotid endarterectomy or carotid angioplasty-stenting; documentation of other medical reason(s) for patient receiving intravenous unfractionated heparin Measure: Percentage of patients aged 18 years and older with the diagnosis of *ischemic* stroke who did not receive intravenous unfractionated heparin	Per Patient Whether or not the patient aged 18 years and older with the diagnosis of *ischemic* stroke who did not receive intravenous unfractionated heparin Per Patient Population Percentage of patients aged 18 years and older with the diagnosis of *ischemic* stroke who did not receive intravenous unfractionated heparin

The following clinical recommendation statements are quoted <u>verbatim</u> from the referenced clinical guidelines and represent the evidence base for the measure:
Dose-adjusted, unfractionated heparin is not recommended for reducing morbidity, mortality, or early recurrent stroke in patients with acute stroke (i.e., in the first 48 hours) because the evidence indicates it is not efficacious and may be associated with increased bleeding complications (Grade B).
IV, unfractionated heparin or high-dose LMW heparin/heparinoids are not recommended for any specific subgroup of patients with acute ischemic stroke that is based on any presumed stroke mechanism or location (e.g., cardioembolic, large vessel atherosclerotic, vertebrobasilar, or "progressing" stroke) because data are insufficient (Grade U). (ANA/ASA[1])

Rationale for the measure:
Administration of IV unfractionated heparin is not generally recommended for stroke patients. This measure was written as an avoidance measure so that the performance goal is 100%, consistent with the other measures. Data elements required for the measure can be captured and the measure is actionable by the physician.

EVIDENCE CLASSIFICATION/RATING SCHEME

American Academy of Neurology (AAN) and the American Stroke Association (ASA) recommendation rating scale[1]
(Anticoagulants and antiplatelet agents in acute ischemic stroke)
Grades of recommendation
Grade A: At least one convincing Class I study or at least two consistent, convincing Class II studies.
Grade B: At least one convincing Class II study or at least three convincing Class III studies.
Grade C: At least two convincing and consistent Class III studies.

Levels of evidence.
Class I: Evidence provided by a prospective, randomized, controlled clinical trial with masked outcome
             assessment, in a representative population. The following are required:
             - Primary outcome(s) is/are clearly defined
             - Exclusion/inclusion criteria are clearly defined
             - Adequate accounting for dropouts and crossovers with numbers sufficiently low to have minimal
             potential for bias
             - Relevant baseline characteristics are presented and substantially equivalent among treatment
             groups, or there is appropriate statistical adjustment for differences
Class II: Evidence provided by a prospective, matched cohort study in a representative population with masked
             outcome assessment that meets all the above, OR a randomized, controlled trial in a representative
             population that lacks one of the above criteria.
Class III: Evidence provided by all other controlled trials (including well defined natural history controls or patients
             serving as own controls) in a representative population, in which outcome assessment is independent of
             patient treatment.
Class IV: Evidence from uncontrolled studies, case series, case reports, or expert opinion.

American College of Chest Physicians (ACCP) – Guide to Grades of Recommendations[2] *(Antithrombotic and thrombolytic therapy for ischemic stroke)*

Grade of Recommendation	Clarity of Risk/Benefit	Methodologic Strength of Supporting Evidence	Implications
1A	Clear	Randomized trials without important limitations	Strong recommendation; can apply to most patients in most circumstances without reservation
1B	Clear	Randomized trials with important limitations (inconsistent results, methodologic flaws[†])	Strong recommendations, likely to apply to most patients
1C+	Clear	No RCTs, but RCT results can be unequivocally extrapolated, or overwhelming evidence from observation studies	Strong recommendation; can apply to most patients in most circumstances
1C	Clear	Observation studies	Intermediate-strength recommendation; may change when stronger evidence available
2A	Unclear	Randomized trials without important limitations	Intermediate-strength recommendation; best action may differ depending on circumstances or patients' or societal values
2B	Unclear	Randomized trials with important limitations (inconsistent results, methodologic flaws)	Weak recommendation; alternative approaches likely to be better for some patients under some circumstances
2C	Unclear	Observation studies	Very weak recommendations; other alternatives may be equally reasonable

[*] Since studies in categories B and C are flawed, it is likely that most recommendations in these classes will be level 2. The following considerations will bear on whether the recommendation is grade 1 or grade 2: the magnitude and precision of the treatment effect, patients' risk of the target event being prevented, the nature of the benefit, the magnitude of the risk associated with treatment, variability in patient preferences, variability in regional resource availability and health-care delivery practices, and cost considerations. Inevitably, weighing these considerations involves subjective judgment.

[†] These situations include RCTs with both lack of blinding and subjective outcomes, where the risk of bias in measurement of outcomes is high, and with large loss to follow-up.

American Stroke Association (ASA) recommendation rating scale[3] *(Management of patients with ischemic stroke)*
Strength of recommendation
Grade A: Supported by level I evidence
Grade B: Supported by level II evidence
Grade C: Supported by level III, IV, or V evidence

Level of evidence
Level I: Data from randomized trials with low false-positive and low false-negative errors
Level II: Data from randomized trials with high false-positive or high false-negative errors
Level III: Data from nonrandomized concurrent cohort studies
Level IV: Data from nonrandomized cohort studies using historical controls
Level V: Data from anecdotal case series

American Stroke Association (ASA) recommendation rating scale for radiological diagnostic tests[3] *(Management of patients with ischemic stroke)*
Strength of recommendation
Grade I: Established as useful/predictive or not useful/predictive for the given condition in the specified population.
Grade II: Probably useful/predictive or not useful/predictive for the given condition in the specified population.
Grade III: Possibly useful/predictive or not useful/predictive for the given condition in the specified population.
Grade IV: Data are inadequate or conflicting. Given current knowledge, the test/predictor is unproven.

Level of evidence
Class A: Evidence provided by a prospective study in a broad spectrum of persons with the suspected condition, using a "gold standard" for case definition, where test is applied in a blinded evaluation, and enabling the assessment of the appropriate tests of diagnostic accuracy.
Class B: Evidence provided by a prospective study of a narrow spectrum of persons with a suspected condition, or a well-designed retrospective study of a broad spectrum of persons with an established condition (by the "gold standard") is compared to a broad spectrum of controls, where test is applied evaluation and enabling the assessment of appropriate tests of diagnostic accuracy.
Class C: Evidence supplied by a retrospective study where either persons with an established condition or controls are of a narrow spectrum, and where test is applied in a blinded evaluation.
Class D: Any design where test is not applied in blinded evaluation OR evidence provided by expert opinion alone or in descriptive case series (without controls).

American College of Cardiology/American Heart Association (ACC/AHA/ESC) rating scale[4] *(Recommendations for patients with atrial fibrillation)*

Strength of recommendation
Class I: Conditions for which there is evidence for and/or general agreement that the procedure or treatment is useful or effective.
Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the usefulness/efficacy of a procedure or treatment.
              Class IIa: The weight of evidence or opinion is in favor of the procedure or treatment.
              Class IIb: Usefulness/efficacy is less well established by evidence or opinion.
Class III: Conditions for which there is evidence and/or general agreement that the procedure or treatment is not useful/effective and in some cases can be harmful.

Level of evidence
Evidence A: Data were derived from multiple randomized clinical trials
Evidence B: Data were derived from a limited number of randomized trials, nonrandomized studies or observational registries
Evidence C: Data were derived from expert consensus

17

Veterans Affairs/Department of Defense recommendation rating scale (VA/DoD)[5] *(Clinical practice guideline for the management of stroke rehabilitation)*

Quality of Evidence (QE)

I	At least 1 properly done RCT
II-1	Well-designed controlled trial without randomization
II-2	Well-designed cohort or case-control analytic study
II-3	Multiple time series, dramatic results of uncontrolled experiment
III	Opinion of respected authorities, case reports, and expert committees

Overall Quality

Good	High-grade evidence (I or II-1) directly linked to health outcome
Fair	High-grade evidence (I or II-1) linked to intermediate outcome; or Moderate-grade evidence (II-2 or II-3) directly linked to health outcome
Poor	Level III evidence or no linkage of evidence to health outcome

Grade the Recommendation

A	A strong recommendation that the intervention is always indicated and acceptable
B	A recommendation that the intervention may be useful/effective
C	A recommendation that the intervention may be considered
D	A recommendation that a procedure may be considered not useful/effective, or may be harmful.
I	Insufficient evidence to recommend for or against—the clinician will use clinical judgment

American Stroke Association rating scale[6] (G*uidelines for Prevention of Stroke in Patients with Stroke or TIA*)

Strength of recommendation
Class I: Conditions for which there is evidence for and/or general agreement that the procedure or
              treatment is useful or effective.
Class II: Conditions for which there is conflicting evidence and/or a divergence of opinion about the
              usefulness/efficacy of a procedure or treatment.
              Class IIa: The weight of evidence or opinion is in favor of the procedure or treatment.
              Class IIb: Usefulness/efficacy is less well established by evidence or opinion.
Class III: Conditions for which there is evidence and/or general agreement that the procedure or treatment
              is not useful/effective and in some cases can be harmful.

Level of evidence
Evidence A: Data were derived from multiple randomized clinical trials
Evidence B: Data were derived from a single randomized trial or randomized studies
Evidence C: Expert opinion or case studies

References

1. Coull BM Williams LS, Goldstein LB, Meschia JF, Heitzman D, Chaturvedi S, et al. Anticoagulants and antiplatelet agents in acute ischemic stroke: Report of the joint stroke guideline development committee of the American Academy of Neurology (AAN) and the American Stroke Association (ASA) (a division of the American Heart Association). *Neurology* 2002; 59; 13-22.

2. Albers GW, Amarenco P, Easton JD, Sacco RL, and Teal P. Antithrombotic and thrombolytic therapy for ischemic stroke. *Chest* 2001;119; 300-320.

3. Adams HP, Adams RJ, Brott T, del Zoppo GJ, Furlan A, Goldstein RL, et al. Guidelines for the early management of patients with ischemic stroke: A scientific statement from the Stroke Council of the American Stroke Association (ASA). *Stroke* 2003; 34; 1056-1083.

4. American College of Cardiology, American Heart Association, European Society of Cardiology. ACC/AHA/ESC guidelines for the management of patients with atrial fibrillation. *J Am Coll Cardiol* 2001; 38; 1266i-lxx.

5. Veterans Administration, Department of Defense (VA/DoD). *Clinical practice guideline for the management of stroke rehabilitation in the primary care setting*. 2003. Available from National Guideline Clearinghouse. http://www.guideline.gov/

6. Sacco RL, Adams R, Albers G, Alberts MJ, et al. Guidelines for Preventions of Stroke in Patients with Ischemic Stroke or Transient Ischemic Attack: A statement for healthcare professionals from the American Heart Association/American Stroke Association Council on Stroke. *Stroke* 2006;37:577-617.

7. Albers GW, Hart RG, Lutsep HL, Newell DW, Sacco RL. Supplement to the Guidelines for the Management of Transient Ischemic Attacks: A statement from the ad hoc committee on guidelines for the management of transient ischemic attacks, Stroke Council, American Heart Association (AHA). *Stroke* 1999; 30; 2501-2511.

8. Albers GW, Amarenco P, Easton JD, Sacco RL, Teal P. Antithrombotic and Thrombolytic Therapy for Ischemic Stroke: The Seventh ACCP Conference on Antithrombotic and Thrombolytic Therapy. *Chest* 2004;126;483-512.